

COMPUTER AIDED TEST

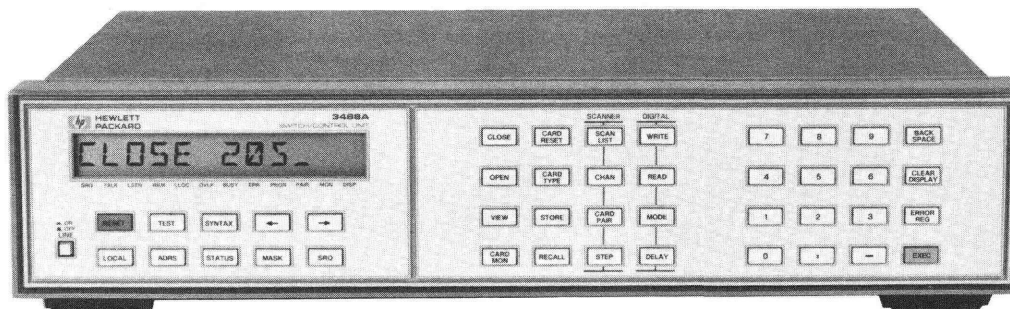
Low Cost, Versatile HP-IB Switching & Control

HP Model 3488A

595

Test Equipment Depot - 800.517.8431 - 99 Washington Street Melrose, MA 02176 - TestEquipmentDepot.com

- DC—26.5 GHz signal switching
- Matrix, multiplexer, & general purpose relays
- Digital I/O control & actuation
- Up to 50 channels
- 40 configuration storage registers
- 11 switch & control modules



HP 3488A

Description

The HP 3488A Switch/Control Unit brings versatile, HP-IB programmable switching to tests requiring multi-channel measurements. The HP 3488A provides signal switching with the integrity and isolation needed for high performance test systems in production. It also offers a flexible, low cost interconnection solution for automating experiments on the bench and for development testing in the lab. The HP 3488A is designed to hold any combination of up to 5 of the following optional switch and control modules:

- 10 Channel Relay Multiplexer
- 10 Channel General Purpose Relay
- Dual 4 Channel VHF Switch
- 4 x 4 Matrix Switch
- 16 Bit Digital Input/Output
- Breadboard
- 3 Channel 18 GHz Switch
- 7 Channel Form-C Relay
- 2 Channel Microwave Switch
- 1.3 GHz 50 and 75 ohm Multiplexers

Flexible Switching

The HP 3488A offers an economical approach to switching flexibility through plug-in modules. The user can select the right combination of switching functions to meet both performance and budget requirements. Testing is simplified by having one solution for connections of low level DVM inputs, high level dc and ac power, and microwave signals to 26.5 GHz. Additional devices such as microwave relays and programmable attenuators are easily controlled with digital I/O functions. Custom circuitry can also be implemented on breadboard modules.

Versatile Performance

The HP 3488A can store up to 40 complete switch configurations for convenient recall in automated test programs. Switch operation can be with multiple relay closures or with selectable channels in a break-before-make mode. Break-before-make closures and recallable complete switch configurations can be combined in a programmable scan list. The HP 3488A uses removable screw terminal connectors that provide easily interchangeable wiring configurations for each test. Built-in self-test capability assures proper operation.

Multiplexer (Opt. 010/HP 44470A)

Option 010 is a 10 channel multiplexer for scanning or multiple signal connections. Channels switch 2 wires (Hi & Lo) with 2PST relays for DVM inputs and other signals up to 250 V and 2A. This module can also be used to multiplex signals to other switching functions such as the matrix module.

General Purpose Relay (Opt. 011/HP 44471A)

This module consists of 10 SPST independent relays for general signal switching and control of external devices. The quality connections provided make this module ideal for switching signals when multiplexing isn't required or for supplying switchable power to the device under test.

VHF Switch (Opt. 012/HP 44472A)

The VHF module provides broadband switching capability for high frequency and pulse signals. The 2 independent groups of bidirectional 1 x 4 switches can be used for signals from dc to 300 MHz. All channels have 50 ohm characteristic impedance and are break-before-make within a group of 4 channels. Each group is isolated from the other and from ground to prevent ground loops. Excellent isolation makes this module ideal for high frequency signal analyzer measurements requiring a large dynamic range.

Matrix Switch (Opt. 013/HP 44473A)

Option 013 offers highly flexible switching with a 4 x 4, 2 wire matrix. Any combination of 4 input channels may be connected to any combination of 4 output channels. Each cross point or node in the matrix uses a 2PST relay to switch 2 lines (Hi & Lo) at a time. Multiple 4 x 4 modules can be connected to form larger matrices. Multiplexers can be used in conjunction with this module to effectively expand the number of inputs and outputs of the matrix.

Digital I/O (Opt. 014/HP 44474A)

This module offers 16 very flexible bidirectional I/O lines and 4 TTL compatible handshake lines for sensing and control of external devices. The digital inputs can be used to sense contact closures to ground. Each channel provides current sinks for remote switching of external relays such as the HP 33311 series of coaxial switches.

Breadboard (Opt. 015/HP 44475A)

The breadboard module provides a convenient way to implement custom circuits and special functions that interface directly with the HP 3488A's backplane control signals.

Microwave Switch (Opt. 016/HP 44476A)

This microwave switch furnishes three independent SPST 50-ohm coaxial switches with excellent performance from DC to 18 GHz. The 3-mm SMA connector allows the user to easily connect cables for multiple system configurations.

Form-C Relay (Opt. 017/HP 44477A)

This module provides seven separate SPDT channels for general purpose switching and control of external devices. Using a power supply, the module can drive programmable attenuators and non-HP coaxial switches.

COMPUTER AIDED TEST

Low Cost, Versatile HP-IB Switching & Control (cont'd)

HP Model 3488A

Microwave Switch (Opt 018/HP 44476B)

The module brings multi-port 50-ohm coaxial switching to your test system. The module can mount any two HP 3331XX Coaxial Switches. The HP coaxial relays come in three-, four-, and five-port configurations, different switches for a variety of applications. HP Coaxial Switches that can be used are listed on the following table.

| HP Coaxial Switch | Port | Frequency |
|-------------------|------|---------------|
| HP 33311B/Opt.011 | 3 | dc-18 GHz |
| HP 33311C/Opt.011 | 3 | dc-26.5 GHz |
| HP 33312B/Opt.011 | 4 | dc - 18 GHz |
| HP 33312C/Opt.011 | 4 | dc - 26.5 GHz |
| HP 33313B/Opt.011 | 5 | dc-18 GHz |
| HP 33313C/Opt.011 | 5 | dc - 26.5 GHz |

1.3 GHz 50 ohm Multiplexer (Opt. 44478A)
1.3 GHz 75 ohm Multiplexer (44478B)

These modules bring bi-directional switching of signals from DC to 1.3 GHz, with high channel isolation (> 55 dB @ 1 GHz). Each module consists of two groups of 1 x4 multiplexers. All test connections are made to BNC's on the module's edge. Off-channels can be resistively terminated.

Specifications for Opt. 010/HP 44470A Multiplexer, Opt. 011/HP 44471A General Purpose Relay, and Opt. 013/HP 44473A Matrix Switch and Opt. 017/HP 44477A Form-C Relay Switch Modules

Input Characteristics

Maximum voltage (terminal-terminal or terminal-chassis): 250 V dc, 250 Vac rms, 350 Vac peak

Maximum current: 2A dc, 2A ac rms

Maximum power: 60 W dc, 500 VA ac

Thermal offset: < 3 μ V

DC (40°C, 60% RH)

Channel-channel, open channel: > 10¹¹

AC Isolation/Performance

| (50 Ω termination) | 100 kHz | 1 MHz | 10 MHz |
|---------------------------|---------|-------|--------|
| Insertion Loss (dB) | <0.30 | <0.35 | <0.90 |
| Crosstalk (dB) | <-73 | <-53 | <-33 |

Specifications For Opt. 012/HP 44472A VHF Switch Module

Input Characteristics

Maximum Voltage

Center-center, center-low: 250 Vdc, 30 Vac rms, 42 Vac Peak
 Low-chassis, low-low: 42 V dc

Maximum current (per channel): 30 mA dc, 300 mA ac rms

Thermal offset: < 15 μ V per channel

Characteristic impedance: 50

AC Isolation/Performance

| | 30 MHz | 100 MHz | 300 MHz |
|-----------------------------|--------|---------|---------|
| Crosstalk (dB) Chan-Chan | <-100 | <-85 | <-65 |
| Group-Group | <-85 | <-75 | <-50 |
| Insertion Loss (dB) | <0.5 | <0.75 | <1.25 |
| VSWR | <1.06 | <1.12 | <1.43 |

All channels break-before-make within a group of 4 channels.

Specifications for Opt. 014/HP 44474A

Digital I/O Module

I/O Lines

Maximum voltage = +30 Vdc (line-chassis)

Output characteristics: V (high) >2.4 V; V (low) <0.4V

I (low) maximum = 125 mA @ V (low) <1.25 V; fused at 250 mA.

Input characteristics: V (high) >2 V; V (low) <0.8 V

External increment: advances HP 3488A to next programmed configuration on falling edge of TTL pulse.

Channel closed: indicates completion of new configuration; TTL pulse.

Specifications for Opt. 016/HP 44476A

Microwave Switch Module

Frequency Range: dc to 18 GHz

Isolation: >90 dB

Impedance: 50 Ohms

Insertion Loss: <0.05 dB

SWR: 1.40

Specifications for Opt. 018/HP 44476B

Microwave Switch Module

Refer to HP 3331XX specifications.

Specifications for Opt. 019/HP 44478A and Opt. 020/HP 44478B 1.3 GHz Multiplexers

Input Characteristics

Maximum Voltage: 42V DC + AC Peak

Maximum Current per channel: 1 A DC or AC RMS

Maximum Power per channel: 24W, 24VA, or 44 dBm

Impedance: 50 ohms (Opt. 019/HP 44478A)

75 ohms (Opt. 020/HP 44478B)

AC Performance

| | ≤ 10 MHz | ≤ 100 MHz | ≤ 500 MHz | ≤ 1.3 GHz |
|---|---------------|----------------|----------------|----------------|
| Insertion Loss (dB) $\leq (40^\circ\text{C}, 95\% \text{ RH})$ | <0.3 | <0.7 | <1.5 | <3.0 |
| $\leq (25^\circ\text{C}, 40\% \text{ RH}), (\text{Typ.})$ | <0.2 | <0.5 | <1.1 | <1.9 |
| Crosstalk (dB) ¹ Channel-Channel | | | | |
| Channel-Common | <-90 | <-80 | <-65 | <-55 |
| Group-Group, Module-Module | <-90 | <-80 | <-70 | <-60 |
| VSWR | <1.2 | <1.25 | <1.35 | <1.55 |

General Specifications

Environmental

Temperature: 0 to 55°C; humidity: 95%, 0 to 40°C

Power: 86-132 V/195-250 V, switch selectable; 48 - 440 Hz; 18 VA.

Interface: SH1 AH1T6TEOL4LEOSRIRL1PPODCIDT1E2

Size: 89 mm H (without feet) x 425 mm W x 292 mm D (3.5 " x 16.75" x 11.5"). Allow 76 mm (3") additional depth for wiring.

Weight: net: 8.5 kg (18.5 lb). Shipping: 16 kg (36.5 lb).

Connectors: Removable screw terminal connector. Each terminal accepts 18-26 gauge (16-40 mils) wire, with strain relief for wiring. Opt. 012/HP 44472A VHF Switch: BNC connectors. Opt. 016/HP 44476A and Opt. 018/HP 44476B Microwave Switch: SMA connectors.

Ordering and Configuration information

HP 3488A Switch/Control Unit

Price

~~\$65~~ \$25

Switch Modules-Includes Terminal Connectors

Opt. 010/HP 44470A: 10 Channel Relay Multiplexer Module \$455

Opt. 011/HP 44471A: 10 Channel General Purpose Relay Module \$455

Opt. 012/HP 44472A: Dual 4 Channel VHF Switch Module \$660

Opt. 013/HP 44473A: 4x4 Matrix Switch Module \$560

Opt. 014/HP 44474A: 16 Bit Digital Input/Output Module \$455

Opt. 015/HP 44475A: Breadboard Module \$191

Opt. 016/HP 44476A: Microwave Switch Module \$2,110

Opt. 017/HP 44477A: Form-C Relay Module \$455

Opt. 018/HP 44476B: Microwave Switch Module \$455

Opt. 019/HP 44478A: 1.3 GHz 50 ohm Mux \$825

Opt. 020/HP 44478B: 1.3 GHz 75 ohm Mux \$900

Rack Mounting and Manuals

Opt. 401: Side Handle Kit (HP P/N 5061-1171) \$43

Opt. 907: Front Handle Kit (HP P/N 5061-1170) \$55

Opt. 908: Rack Flange Kit (HP P/N 5061-1168) \$35

Opt. 909: Rack Flange with Handles (HP P/N 5061-1169) \$79

Opt. 910: Extra Operating & Service Manuals \$84

Opt. W30: Three Year Hardware Support \$50